

# Supervisor's Review of Master Thesis

**Author:** Jakub Cmíral  
**Title:** Edge Detection and 3D Reconstruction  
Based on the Shape-from-Focus

**Supervisor:** Ing. Pavel Krsek, Ph.D.  
**Affiliation:** CTU in Prague, CIIRC  
department: Robotics and machine perception (RMP)

The topic of the thesis deals with optical feedback of micro-assembly machine. The algorithms of optical measurement are used for precise orientation and placemen of electronic micro-modules. The thesis describes suitable stat of the art methods for edge detection. Selected methods were implemented and used for focusing of the optical system and for geometric calibration. Main part of the thesis is dedicated to 3D reconstruction by "Shape from Focus" method. Author designed his own 3D convolution kernel for edge detection. Results of the detection are processed by filtration. Final 3D surface is obtained by triangulation. Functionality of developed method is documented by reconstruction of two selected scenes.

The thesis is written in English. It is well structured. The author describes the assigned topic clearly and comprehensibly. Typography and language of the thesis has very good level. The author cited correctly relevant sources and he was active in searching of literature.

Mr. Cmíral demonstrated the ability to work independently on engineering and scientific topics. He is to able search, read and analyze research articles. He has been successfully implementing his own algorithms and algorithms from literature. He is also the author/coauthor of scientific articles. He works independently, but also cooperates with colleagues effectively.

In my opinion, the author fulfilled the assignment of the thesis. The thesis satisfies all demands for a master theses. The author has demonstrated adequate knowledge in the field of study and his ability of professional work. Based on the above facts, I am **recommending** the thesis to the defense. My final evaluation of the master thesis is **A (excellent)**.

In Prague 31. 5. 2019

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Ing. Pavel Krsek, Ph.D.  
Supervisor